

G-6 Road  
Watershed Rehabilitation Project Summary Report

Michael Kenning

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Original copy available on Archival film, AT-2 at Forest of Gales, Oregon

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Other Parts, maps, and descriptions

Unpublished Maps: Ex of 1:6,000 scale, sheets 7-10

7-10

8-10

Other maps and printed maps available

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## INTRODUCTION

Unit 87-2 is located on the west side of Redwood Creek, within the drainage basin of Tom McDonald Creek (Map A). The unit is located in Sections 11 and 12 of T.9N., R.1E., Humboldt Meridian, and is approximately 8 air miles southeast of Orick, California. The portion of the G-6 above the south bank of Tom McDonald Creek, 1.2 miles long, was removed as part of the rehabilitation program of Redwood National Park.

The mapped area covers approximately 140 acres from the G-Line down along the right bank of Tom McDonald Creek, up a tributary creek to the watershed divide at the G-Line Deck (Map B). Relief varies from a high of 980 feet on the G-Line to a low of 260 feet at the eastern limit of the mapped area. Elevation along most of the G-6 is between 600-800 feet. The lowest elevation on the G-6 is at the bridge where it is 440 feet.

The hydraulic area of Tom McDonald Creek at the G-6 bridge is about 3,300 acres and drains the northern slopes of Rodgers Peak. The tributary drainages crossing the G-6 have much smaller areas, ranging from less than 5 acres to about 70 acres, and these drain the hillside above the eastern end of the G-Line. Slopes adjacent to Tom McDonald Creek are quite steep, often exceeding 80% within streamside failure scarps. The topography is gentler in the area below the G-Line Deck, generally 10-40%.

## LOGGING AND ROAD CONSTRUCTION HISTORY

Much of the slope below the G-6 consists of old growth redwood and Douglas Fir. Map C shows the boundary between the old growth forest and the cable yarded slopes which were clear cut in the early 1950s from landings along the G-Line. Additional cable yarded slopes on the east end of the unit, outside the mapped area, were logged in the mid 50's from the G-3 road. This road was constructed along a spur ridge off the G-Line Deck. The G-Line deck area was first logged in the early 1950s and the deck was constructed in the mid 1960s. A more detailed description of the logging history of the G-Line area can be obtained from Summary Reports 84-1 and 85-3.

The G-6 road was constructed between July 1974 and September 1975 to provide access to some 30 acres of old growth remaining within the map unit, but Park expansion occurred before logging could begin. A log bridge across Tom McDonald Creek connected the road with the C-Line and C-9 roads higher up the slope. (The bridge and that portion of the G-6 on the other side of the creek were removed, along with the C-9, as part of Rehabilitation Unit 87-6.) The G-6 was rocked with a coarse base quarried from the M-6 rock pit and possibly the G-Line rock pit. A few pieces were in

excess of 1 foot in diameter and, protruding partly above the surface, resulted in a very uneven surface. Gravel would probably have been placed on the road prior to timber operations. In addition, several hundred feet of a skid trail was constructed at irregular intervals immediately above and parallel to the G-6 during or following construction of the G-6.

#### EROSION FEATURES

Most of the area in the unit lies within the inner gorge of Tom McDonald Creek. The area is underlain by the Schist of Redwood Creek, which is a part of the Franciscan assemblage (Hardin and others, 1982). Outcrops of competent schist occur mainly on cutbanks where the road crosses spur ridges. The bedrock near the bridge is a dark gray to black sheared schist.

The soils in the reach near the bridge are a poorly drained colluvium and are saturated for most of the year (Popenoe, "Soils of the G-6 Road Rehabilitation Unit, Tom McDonald Creek Watershed", 1984). Locations along the road that were mapped by Popenoe as Devils Creek and poorly drained Entisols correspond to areas within or adjacent to streams, swales, or landslides. The soils map shows that the majority of the soils along the G-6 are well drained brown soils, mostly Copper Creek and Ahpah soils.

Mass wasting is the predominant erosion process on this site. A type of mass movement common in the schist terrane in the Park is blocksliding in which the movement is mostly translational rather than rotational (Sonnevil and others, 1985). These slides are characterized by episodic movement related to storm events and are usually underlain by a sheared black schist at the failure surface (Sonnevil and others, 1985). There are many active landslides surrounding the G-6. Some have indistinct or discontinuous scarps with no apparent movement for several years.

Also common are streamside failures and fill failures, especially near the bridge (Map C). The toes of the landslides near the bridge are at the edge of the creek, which is also the base of the fillslope. Here many springs and seeps appear in the mobile slopes above the road near the head scarps and at the base of the inboard ditch. The road from the bridge to approximately station 6 was slowly moving towards the creek as evidenced by tension cracks across the road and a lowering of the road prism near the bridge.

Much of the ground surface in the old growth below the G-6 alternates between irregularly spaced benches of varying width and steep breaks in slope that mark the location of scarps. The

scarps are often heavily vegetated, and many are continuous for several hundred feet. There are many partially decayed and buried logs lying about from trees that fell probably from a combination of unstable ground and wind. Often the ground surface seems to be composed chiefly of partially rotted logs.

The traces of some landslides, although obscured in places by vegetation, can be seen through stereo viewing of aerial photographs. The trace of one can be seen between the G-6 and G-Line roads. The side scarps are about 800 feet apart at the G-6 and have not displaced the road since construction in 1974. The left (downstation) side scarp near station 18 carries flow below the road during the wet months and has created a gully several feet deep. This reach was excavated as stream crossing RX-1. The head/side scarp region below the G-Line has a vertical displacement of 10-20 feet and has not increased in size for several years.

Another area of slope movement is located along the first order perennial tributary streams between RX-3 on the G-6 and the G-Line (Map C). There have been several small sidebank failures in the gray gravelly soils next to the streams. The head scarps range from 3 feet to about 15 feet in height, but the side scarp heights are more difficult to determine due to their merging with other scarps and to subsequent gullying and revegetation. These sidebank failures have overturned stumps and delivered sediment and organics to the streams. Many of the organics in the streams are large bucked logs which have no doubt contributed to the slope instability by diverting flow against the stream banks. One or two of the cross-road drains constructed across the G-Line in this area in 1985 provide runoff to some of the scarps in this reach and may have caused renewed movement.

Sediment delivery from the above problems had caused approximately 1 to 4 feet of aggradation at the confluence of these streams just above the G-6 Road. This crossing (RX-3) contained three culverts at different elevations in the fill at the time of excavation. The lowest culvert was installed off center near the right edge and the inlet was nearly buried. During the February 1986 storms, a second, higher 24 inch culvert was almost plugged as well. A pond formed and the overflow threatened to erode the crossing. This was averted by draining the pond using a pump and siphon. Later, a third 24 inch culvert was installed close to the road surface to provide an overflow path.

Some culverts along the G-6 were placed without consideration of the upslope drainage. For example, the ephemeral drainage at RX-2 shows channel definition above the road, but is not as well defined below the road. The 18 inch culvert was placed almost 100 feet away and the stream flow was carried along the inboard ditch to the culvert. This resulted in a minor fill failure and

gully, but the potential for greater erosion existed, and could have resulted in much more erosion if a larger storm event (25 yr. return interval or greater) had occurred.

In general, most of the large mass movement features within the rehabilitation unit pre-date logging activities. The G-6 road was the main source of sediment to Tom McDonald Creek and its tributaries. These sediment sources were in the form of unstable road benches and stream crossings. Heavy equipment was used to excavate the erodable sections of the road and to haul the spoil to a stable area. This work is discussed in the next section.

## EROSION CONTROL REHABILITATION WORK

### Introduction

The first part of the rehabilitation project involved aerial photo interpretation and geomorphic mapping at a scale of 1:1200. This work was carried out by E. Wosika and M. Kenning from February through April of 1986. Person-hours and cost for the technical work are summarized in Table 1. Preliminary prescriptions were then made to define the appropriate erosion control measures, and this was followed by a peer review where the proposed prescriptions are scrutinized.

Due to attrition of rehabilitation personnel, the G-6 project was put on hold for one season, but was revived in January of 1987. It was decided that erosion control work would be accomplished by an IFB contract rather than by a directed heavy equipment rental contract. This necessitated detailed survey, design and contract preparation work which took place through June of 1987. The work was done by M. Kenning with the assistance of G. Bundros, L. Johnson, J. Wood, J. Hoffard, and D. Steensen. The costs are listed in Table 1.

### Heavy Equipment Work

The IFB contract (# CX-8480-7-0003) was awarded on May 28, 1987 to W.K. Construction Company of Miranda, California for \$74,041.46. Other bids received were: Twin Parks Lumber Co. for \$81,951, Barber Construction for \$100,652, and Nally Enterprises for \$123,951. The totals of all the primary treatments for the winning bid are listed in Table 1 under Heavy Equipment Work. The cost of each bid item made by the contractor is listed in the Bid Schedule and can be found in the archive file for Unit 87-2 at the South Operations Center in Orick.

Heavy equipment work began on July 6 and ended on July 22. The work day was generally 11 hours long Monday through Thursday, from 6:00 am to 5:00 pm, and 10 hours on Fridays. No contract

work was performed on weekends.

The primary excavating machines were a Caterpillar D-8H bulldozer with 2 rear mounted ripper teeth and a Case 980-B hydraulic crawler excavator with a one yd<sup>3</sup> bucket. A Clark Michigan articulated wheel loader with a 3 yd<sup>3</sup> bucket loaded three 10-12 yd<sup>3</sup> dump trucks which hauled the spoil away for those worksites with distant fillsites. In addition, a Case 1450 bulldozer was used for fillsite smoothing and, to a lesser extent, for pushing fill at the various worksites.

During the first day of heavy equipment work the D-8 made turnouts for the dump trucks and bladed the outer edge of the road in an attempt to smooth the road surface by bringing up the "fines". But because there were just too many coarse angular fragments mixed in with the fines, the road surface was not appreciably improved.

The next day all the equipment began work near the bridge on the first exported outslope (EOS) reach at station 1+75. Work proceeded upstation, towards the G-Line Deck. The dump trucks and loader worked for the next 3 days transporting material to the G-Line Deck and to a fillsite at station 27+70. The dump trucks and loader were then released by the contractor for one week, during which time all contract work up to the EOS at sta. 35+68 was completed. This work included RXs, DDs, EOSs, an OS, and several XRDs and an inboard ditch improvement. All OS, XRD, and fill disposal sites were ripped beforehand to a depth of 2 feet.

The next week the dump trucks and loader returned to haul the material from EOS 35+68, plus all the material from crossing RX-3 and about 70% of the material from the EOS at sta. 43+27. This work took approximately 3<sup>1</sup>/<sub>2</sub> days, and completed all remote endhauling. The remaining work consisted of one EOS reach, two deep drains (DD), and cross-road drains spaced roughly 100 feet apart. Also the inboard ditch was improved (widened and deepened) along part of this last road reach.

#### Heavy Equipment Costs

Table 1 summarizes the total quantity, cost, and cost per quantity of each type of primary treatment. Tables 3 through 8 provide a breakdown of most of the Primary treatments into the individual worksites. Ripping, cross-road drains, and inboard ditch improvements however are not listed individually. The only secondary cost that involved heavy equipment was the armoring of a 10 X 27 foot section of EOS 1+75 with local rock to a depth of about 1 foot. The rock should reduce the amount of gullying from emerging groundwater just above the top of cut. The costs were not significant and were not broken out of the primary treatments category.

The individual worksites (bid items) were bid either on a cost per cubic yard basis or on a lump sum basis. Lump sum payments were used for all cross-road drains and inboard ditch work as these jobs are relatively simple and quick to do. Due to the large number of drains and their small excavation cost, volumes are not measured.

For other types of treatments where volumes are computed (RX, OS, EOS, DD), the method of payment is based on whether the size of the excavation is likely to deviate significantly from the planned excavation. Since all the EOS, OS, and DD worksites were straight forward with little probability that subsurface conditions would cause a change in plan, the lump sum payment method was used. The RXs were a different matter because of the uncertainty of conditions at depth. In trying to locate the original stream channel, the final volume may be different from the plans. Therefore payment is based on the actual amount excavated.

The primary treatment tables show equipment hours, excavation rates and other data pertinent to the type of treatment, such as cut depth. The tables also provide a comparison of the contract costs with the expected costs had the job been done by equipment rental. This is called HERE and stands for Heavy Equipment Rental Equivalent. This is computed by using the actual hours of each piece multiplied by the average hourly costs for that piece. The comparisons are summarized in Table 2.

#### Evaluation of Heavy Equipment Work

The contractor and his operators have several years of experience with the Park rehabilitation program. The familiarity with this type of work is reflected in the low HERE costs.

The work this year went quite smoothly and efficiently despite the 19 hours of downtime on the excavator during the contract. This did not slow the operation down when the disposal equipment was being used because the loader, which experienced no down time during the contract, always had a pile of fill for the dump trucks that was provided by the bulldozer. A major breakdown on the excavator that blocked the bulldozer and required a mechanic fortunately occurred just after the trucks and loader had finished with the first part of their work.

On the EOS worksites the bulldozer gradually lowered the road bench and pushed the material in a straight line approximately 150 feet to a pile. This way the bulldozer was able to excavate and push its own fill as well as all the fill from the excavator.

The excavator got the material at the bottom of the cuts on the

EOSs and RXs. This reduced the amount of maneuvering required by the bulldozer. The excavator was able to reach those places too wet or too steep for the bulldozer. The excavator was also able to get material next to the streams without spilling some into the stream or backing into it in order to get the fill.

The crossing RX-3 proved to be the wettest and muddiest worksite. As mentioned previously, the crossing had aggraded just below the confluence above the road, and the culverts had nearly plugged during the February, 1986 storms. The excavator began digging from the top, and was able to dig down to the expected grade for the first 30 feet from the top. Original channel bottom material had been reached based on the larger particle size and darker color change encountered. Both tributaries were flowing, each probably less than 1 CFS. Small organics caused the two lower culverts to plug, and a pond 2 to 3 feet deep and about 20 feet in diameter eventually formed just above the road. The upper part became very muddy, which made digging and grade checking difficult. The equipment moved to the downstation EOS and this was completed before restarting and finishing the crossing on a Monday. The excavator worked from the bottom up, defining the left bank and channel bottom as he went. Finally the road bench, which had been damming the ponded water, was removed, and the right bank was shaped. Not all the aggraded material was removed from the area of the ponded water. The bottom of the excavation was widened so that any downcutting that occurred would have a bench a few feet wide on either side of the thalweg, and would not endanger the stability of the sidebanks.

The method of construction of the cross-road drains used by the contractor was for the D-8 to dig 70-80% of the drain first, followed by the excavator which excavated the bottom and completed the sidebanks and grade.

#### Evaluation of Heavy Equipment Costs

Table 2 compares the actual contract costs to the HERE costs as previously defined. Based on these numbers it appears the government spent over \$27,000 more for the IFB contract than for an equipment rental contract. The amount bid by the contractor was very reasonable and was the lowest of all the bids received. The bid was even lower than the in-house estimate by about \$6,000.

One reason for the difference in bid amounts, other than contractor experience with dump truck work, probably had to do with the terribly rocky surface of the G-6. The in-house estimate included 3 days of road upgrading using loader, dump trucks, grader, and dozer to bring material from the G-Line Deck fillsite to the road in order to make it smooth. It was thought that this was necessary to keep the truck drivers from mutinous behavior due to accelerated wear on their trucks. The cost to do

this was estimated to be approximately \$6,000. This estimate is not shown in Tables 2 and 9 (Miscellaneous costs) because those costs never occurred. The contractor spent just under \$1,200 for upgrading (Access cost in Table 9). He was able to pick the dump truck drivers who would agree to work on the road with those conditions, and did not have to consider drivers who would likely complain. At times the loader operator was placing 4 bucketfulls of heaped fill into each truck. He thought each heaped load was 14 to 15 cubic yards. This reduces the endhaul costs compared with a 10 cubic yard load.

In summary the heavy equipment work went very well and was quickly completed with very good results in approximately 11<sup>1</sup>/<sub>2</sub> working days.

#### Labor Intensive Work

Table 1 lists work the labor intensive work done on the site. The work is divided into Primary Treatments, Secondary Treatments, and Miscellaneous costs.

The one Primary Treatment involved redirecting the flow of a small gully that had escaped its flowcourse and was flowing over the top of the G-6 cutbank. The gully had formed from emerging groundwater in the slopes above the road, but was dry at the time of work. The job took 3 laborers on the Park crew about 2 hours to accomplish the work using picks and shovels, making sure the water would flow down into DD-2 near station 21. The work was well done and the cost was very low. The cost was comparable to what the cost would have been using heavy equipment. In this case, access for the heavy equipment would have been difficult due to the lack of nearby skidtrails. Also a few of the 35 year old second growth would have been knocked down had heavy equipment been used.

Straw mulch costs are summarized in Table 10. The cost per bale with all expenses accounted for is \$11.33 (Tables 1 and 10). The largest expense incurred was straw distribution from the G-Line Deck to the various worksites. This was done a few weeks before the heavy equipment work. Within the EOS and OS reaches the straw was placed on top of the cutbank out of the way of the heavy equipment. To do this the 2<sup>1</sup>/<sub>2</sub> ton boom truck was used to place 4 to 6 bales at a time at or near the top of the cutbank. This was slow work and some of the sites had to be brushed to have room for the boom to swing. However the boom truck was a very useful tool to use; it had a longer reach than the Case 580 backhoe, even with the "extendahoe" attachment on the backhoe.

The straw distributing could have been done under the IFB contract but it was felt that the cost would be lower by doing it in-house. Also supervision of Park personnel was thought to be less hectic than it would be trying to simultaneously monitor

heavy equipment and straw placement by the contractor. Other rehab units have included straw distribution as part of the IFB contract. The actual costs can be compared for future decisions on this matter. Distribution costs on this site could have been reduced somewhat by using one or two fewer laborers on distribution without slowing down the work. There were 6 to 7 persons involved where probably 5 would have been enough.

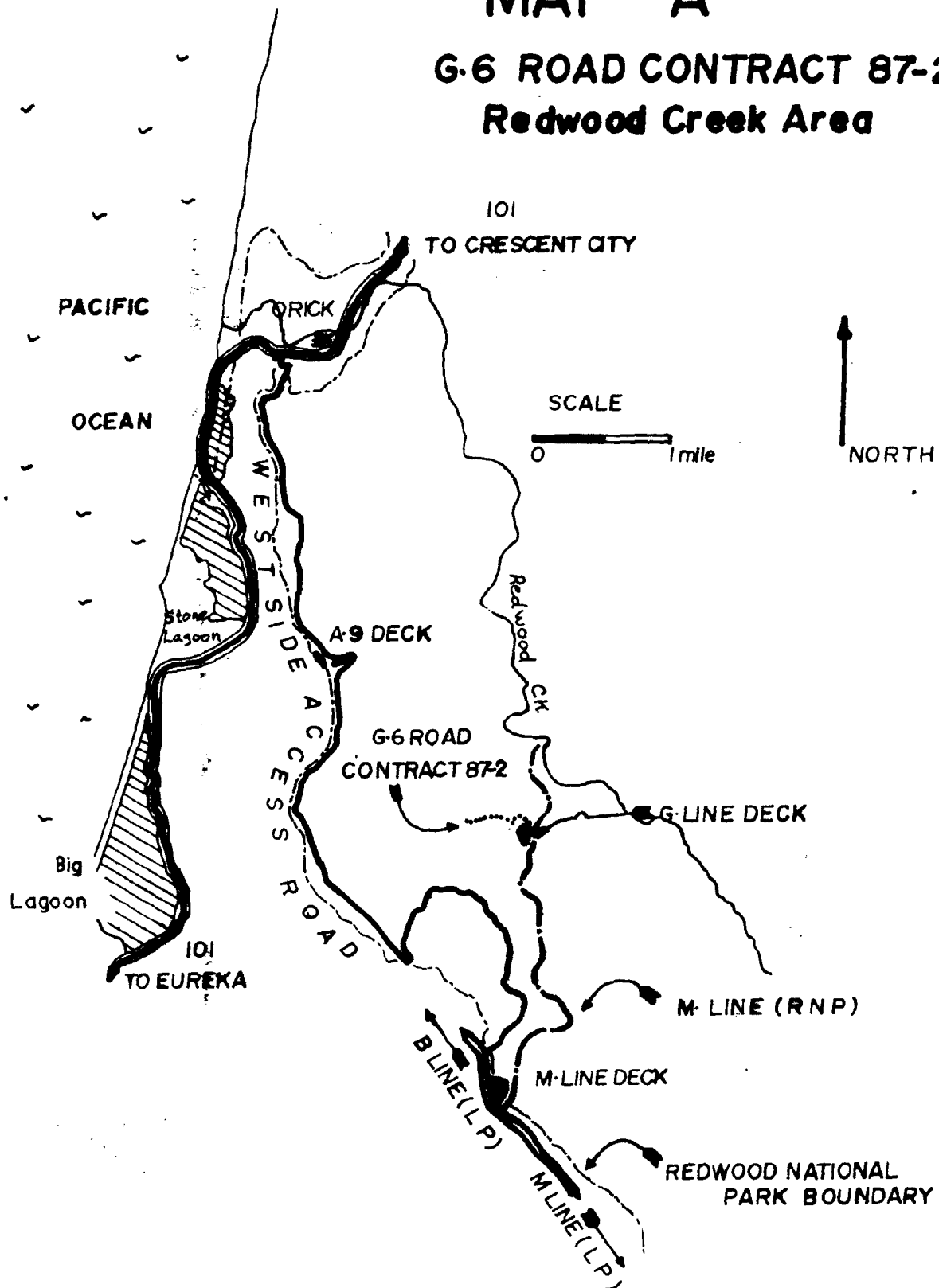
Reducing the number of bales, by for example not placing straw on cross-road drain reaches, would have reduced the total straw costs some, but probably not the cost per bale because the labor involved in placing straw above the inboard ditch was minimal compared to placement on top of cutbanks. For this reason the cross-road drain reaches were strawed, although strictly from an erosional standpoint it probably wasn't necessary.

Redwoods United and the Youth Conservation Corp were used to help spread the straw after the worksites were completed by heavy equipment. This was the next most expensive part of the total straw costs, with Redwoods United being the most expensive part of the labor spreading costs.

The remaining labor work is placed under the Miscellaneous category in Table 1. Most of this cost involved cutting and removing brush and small trees so that surveys could be done to obtain the volumes at the various worksites. In addition some bucked old growth logs on the G-Line Deck and below the G-6 were appraised to see if it was worth the labor cost to get them milled. Most had a decayed core, so the logs were left there.

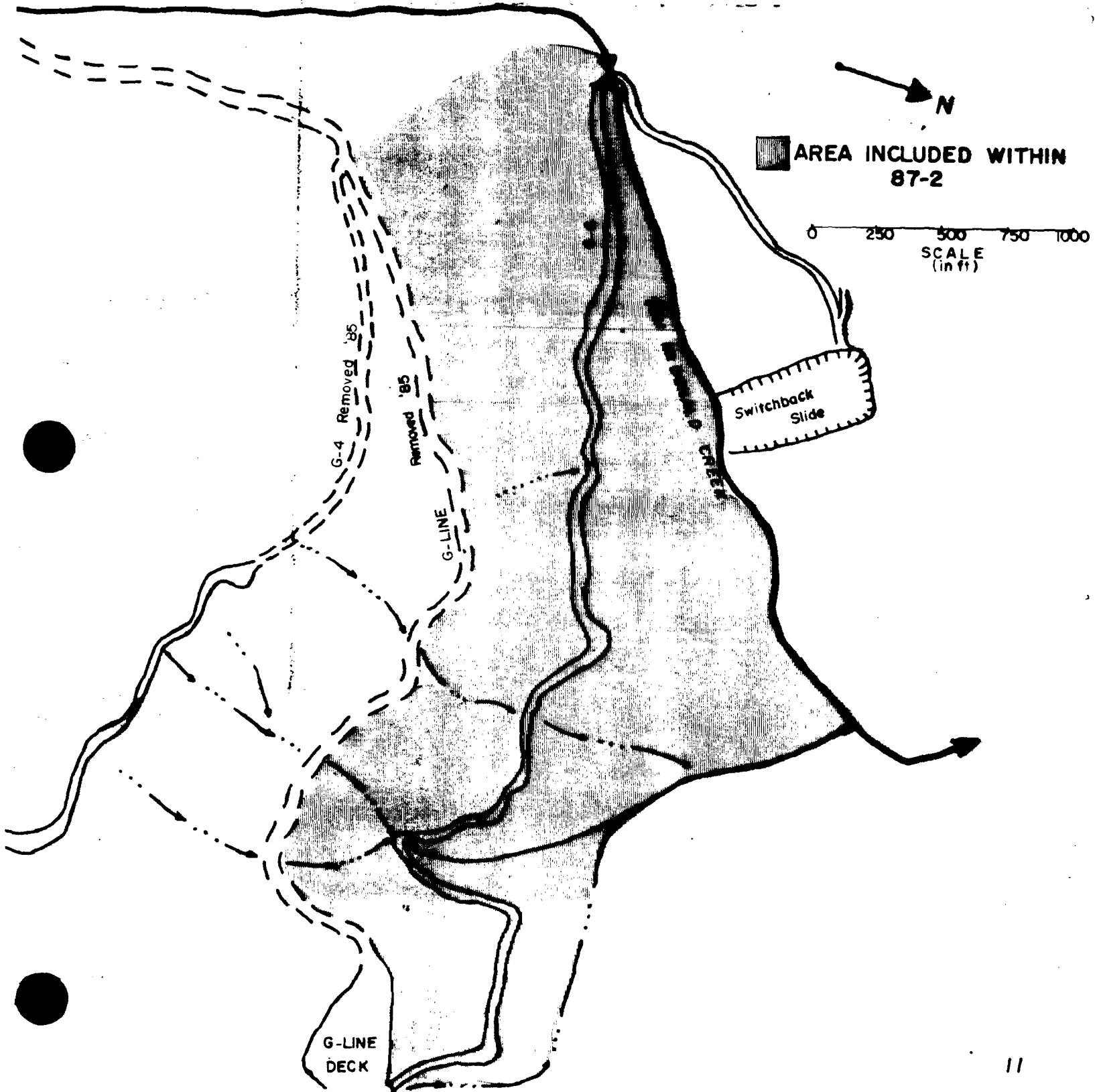
# SITE LOCATION MAP A

**G-6 ROAD CONTRACT 87-2  
Redwood Creek Area**



MAP B  
AREA of UNIT 87-2

SOUTH G-6





UNIT 87-2

# SOUTH G-6 ROAD CONTRACT

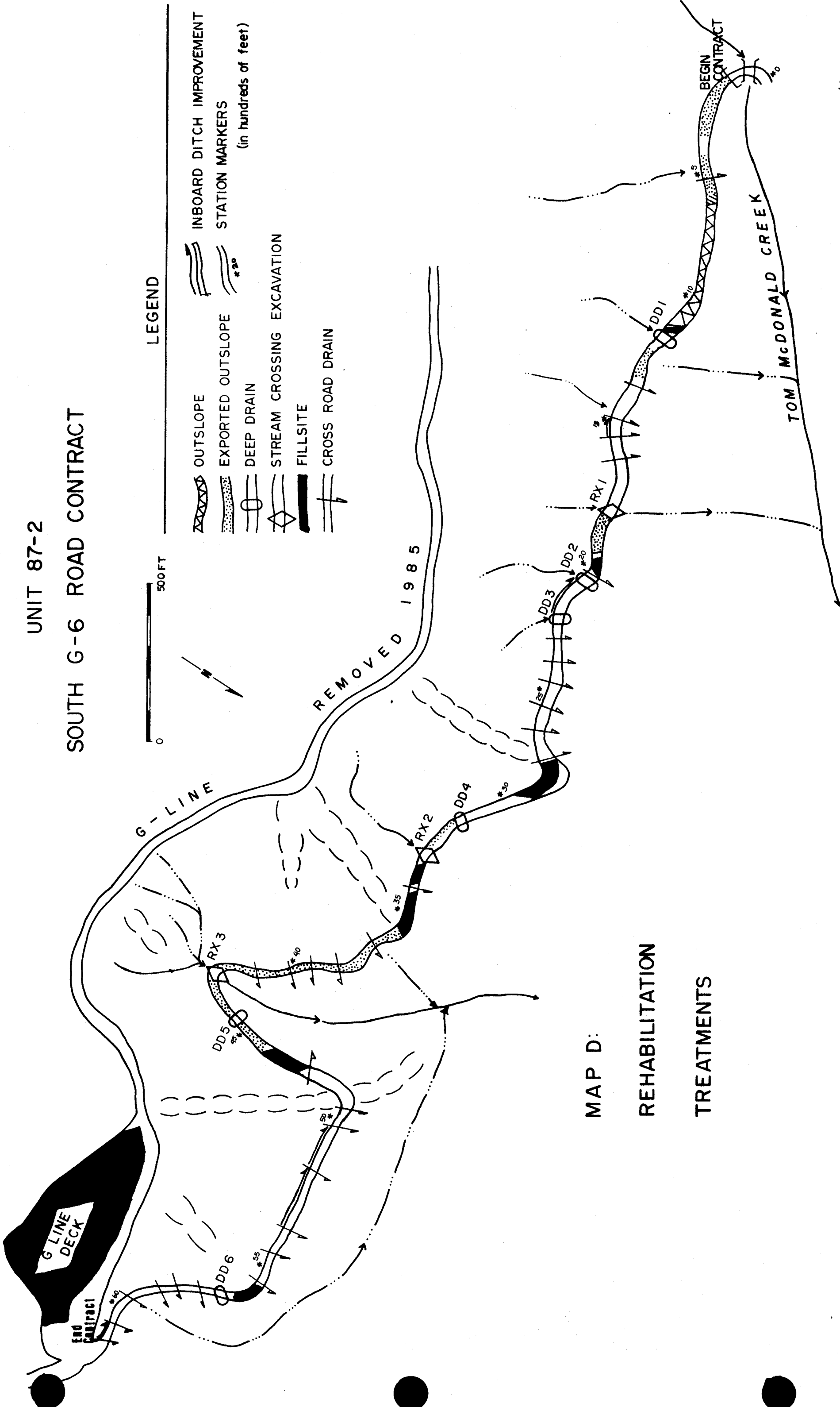


TABLE 1

REHABILITATION WORK COST SUMMARY  
Rehabilitation Unit 87-2    South G-6 Road

|                                                                       | TOTAL<br>QUANTITY     | TOTAL<br>COST   | AVG COST/QUANTITY      |
|-----------------------------------------------------------------------|-----------------------|-----------------|------------------------|
| <b>HEAVY EQUIPMENT WORK:</b> (Contract # CX-8480-7-0003) <sup>1</sup> |                       |                 |                        |
| <u>Primary Treatments</u>                                             |                       |                 |                        |
| Haul Road Crossings                                                   | 3,300 yd <sup>3</sup> | \$12,709        | \$3.85/yd <sup>3</sup> |
| Deep Drains                                                           | 895 yd <sup>3</sup>   | \$2,118         | \$2.37/yd <sup>3</sup> |
| Exported Outslope<br>Truck Endhauled                                  | 8,575 yd <sup>3</sup> | \$48,262        | \$5.63/yd <sup>3</sup> |
| Exported Outslope<br>Blade Endhauled                                  | 835 yd <sup>3</sup>   | \$1,640         | \$1.96/yd <sup>3</sup> |
| Outslope                                                              | 2,280 yd <sup>3</sup> | \$3,853         | \$1.96/yd <sup>3</sup> |
| Cross-Road Drains &<br>Inboard Ditches                                | 1,635 ft              | \$1,449         | \$0.89/ft              |
| Ripping                                                               | 3,800 ft              | \$550           | \$0.14/ft              |
| Miscellaneous Cost <sup>2</sup>                                       |                       | \$3,350         |                        |
| <b>TOTAL HEAVY EQUIPMENT COST</b>                                     |                       | <b>\$73,931</b> |                        |

**LABOR INTENSIVE WORK:**Primary Treatments

|                            |    |      |    |
|----------------------------|----|------|----|
| Divert gully above sta. 21 | -- | \$66 | -- |
|----------------------------|----|------|----|

Secondary Treatments

|                          |           |         |              |
|--------------------------|-----------|---------|--------------|
| Straw Mulch <sup>3</sup> | 547 bales | \$6,196 | \$11.33/bale |
|--------------------------|-----------|---------|--------------|

Miscellaneous

|                    |              |       |           |
|--------------------|--------------|-------|-----------|
| Brush survey lines | 17 worksites | \$834 | \$49/site |
|--------------------|--------------|-------|-----------|

|               |    |      |    |
|---------------|----|------|----|
| Log appraisal | -- | \$67 | -- |
|---------------|----|------|----|

|                                   |    |                    |    |
|-----------------------------------|----|--------------------|----|
| <b>TOTAL LABOR INTENSIVE COST</b> | -- | <del>\$7,097</del> | -- |
|-----------------------------------|----|--------------------|----|

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TABLE 1 (Cont'd)  
REHABILITATION WORK COST SUMMARY  
Rehabilitation Unit 87-2 South G-6 Road

|                                 | Total<br>Quantity      | Total<br>Cost   |
|---------------------------------|------------------------|-----------------|
| <b>TECHNICAL WORK:</b>          |                        |                 |
| <u>Evaluation of Rehab Unit</u> |                        |                 |
| Map Unit                        | 255 person-hours (p-h) | \$3,028         |
| Prescribe Treatments            | 214 p-h                | \$2,630         |
| Survey and Design               | 493 p-h                | \$5,336         |
| Contract Preparation            | 207 p-h                | \$2,497         |
| <u>Supervision of Work</u>      |                        |                 |
| Heavy Equipment (C.O.R.)        | 248 p-h                | \$2,570         |
| <u>Documentation</u>            |                        |                 |
| Photo Points                    | 60 p-h                 | \$610           |
| Summary Report                  | 348 p-h                | \$4,680         |
| <b>TOTAL TECHNICAL WORK</b>     |                        | <b>\$21,351</b> |

**TOTAL PROJECT COST**

102,445  
~~\$102,379~~

<sup>1</sup> Davis-Bacon wage rates did not apply to this contract, which was awarded to W.K. Construction of Miranda, Ca.

<sup>2</sup> Miscellaneous costs include lowboy charges (bid items 1 & 2 in the Bid Schedule), record keeping (Bid Item 4), and Misc. Costs (Bid Item 6).

<sup>3</sup> Straw mulch includes bale cost and delivery (\$3.09/bale), placement, and spreading.

TABLE 2

SUMMARY OF HEAVY EQUIPMENT COSTS AND  
COMPARISON OF CONTRACT VS HERE<sup>1</sup> COSTS  
Rehabilitation Unit 87-2 South G-6 Road

| Treatment                              | Number of<br>worksites | Total<br>Quantity     | <u>Total Costs</u> |          | Government<br>Savings (+)<br>or losses(-) | <u>Average Unit Cost</u> |                        |
|----------------------------------------|------------------------|-----------------------|--------------------|----------|-------------------------------------------|--------------------------|------------------------|
|                                        |                        |                       | Contract           | HERE     |                                           | Contract                 | HERE                   |
| Haul Road<br>Crossings                 | 3                      | 3,300 yd <sup>3</sup> | \$12,709           | \$7,716  | - \$4,993                                 | \$3.85/yd <sup>3</sup>   | \$2.34/yd <sup>3</sup> |
| Deep Drains                            | 6                      | 895 yd <sup>3</sup>   | \$2,118            | \$1,518  | - \$600                                   | \$2.37/yd <sup>3</sup>   | \$1.70/yd <sup>3</sup> |
| Exported Outslope<br>Truck Endhaunched | 5                      | 8,575 yd <sup>3</sup> | \$48,262           | \$23,656 | - \$24,606                                | \$5.63/yd <sup>3</sup>   | \$2.76/yd <sup>3</sup> |
| Exported Outslope<br>Blade Endhaunched | 3                      | 835 yd <sup>3</sup>   | \$1,640            | \$965    | - \$675                                   | \$1.96/yd <sup>3</sup>   | \$1.16/yd <sup>3</sup> |
| Standard Outslope                      | 1                      | 2,280 yd <sup>3</sup> | \$3,853            | \$1,921  | - \$1,932                                 | \$1.69/yd <sup>3</sup>   | \$0.84/yd <sup>3</sup> |
| Cross-road Drains &<br>Inboard Ditches | 28                     | 1,635 ft              | \$1,449            | \$1,326  | - \$123                                   | \$0.89/ft                | \$0.81/ft              |
| Ripping                                | --                     | 3,800 ft              | \$550              | \$347    | - \$203                                   | \$0.14/ft                | \$0.09/ft              |
| Miscellaneous                          | See Table 9            |                       | \$3,350            | \$8,908  | + \$5,558                                 | --                       | --                     |
| TOTALS                                 |                        |                       | \$73,931           | \$46,357 | - \$27,574                                | --                       | --                     |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case Dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

TABLE 3

HAUL ROAD STREAM CROSSING COSTS

Rehabilitation Unit 87-2      South G-6 Road

| ACTUAL EQUIPMENT HOURS                          |               |                |               |                             |                               |               |             |                        |                              |                                               |                                                             |                                                                        |                                             |
|-------------------------------------------------|---------------|----------------|---------------|-----------------------------|-------------------------------|---------------|-------------|------------------------|------------------------------|-----------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------|---------------------------------------------|
| Excavating Equipment                            |               |                |               |                             | Fill Disposal Equipment       |               |             |                        |                              |                                               |                                                             |                                                                        |                                             |
| Worksite <sup>1</sup>                           | D-8<br>Ripper | 980-B<br>Excav | 1450<br>Dozer | 3 yd <sup>3</sup><br>Loader | Three<br>10-12yd <sup>3</sup> |               | Bid<br>Cost | HERE<br>Cost           | Volume<br>(yd <sup>3</sup> ) | Bid<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | HERE <sup>2</sup><br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | Average <sup>3</sup><br>Excavation<br>Rate<br>(yd <sup>3</sup> /pc-hr) | Average<br>Dist to<br>Fillsite<br>(one-way) |
|                                                 |               |                |               |                             | Dump<br>Trucks                | 1450<br>Dozer |             |                        |                              |                                               |                                                             |                                                                        |                                             |
| RX-1 @ Sta 18+49                                | 3.00          | 3.00           | 3.00          | --                          | --                            | --            | \$1,045     | \$781                  | 515                          | \$2.03                                        | \$1.52                                                      | 57                                                                     | 110 ft (B) <sup>4</sup>                     |
| RX-2 @ Sta 32+85                                | 3.75          | 2.50           | --            | --                          | --                            | --            | \$970       | \$616                  | 495                          | \$1.96                                        | \$1.24                                                      | 79                                                                     | 125 ft (B)                                  |
| RX-3 @ Sta 42+55                                | 15.75         | 16.75          | --            | 11.25 <sup>5</sup>          | 32.75                         | 13.00         | \$10,694    | \$6,319                | 2,290                        | \$4.67                                        | \$2.76                                                      | 70                                                                     | 0.5 mi (T)                                  |
| <hr/>                                           |               |                |               |                             |                               |               |             |                        |                              |                                               |                                                             |                                                                        |                                             |
| TOTALS                                          | 22.50<br>Hrs  | 22.25<br>Hrs   | 3.00<br>Hrs   | 11.25<br>Hrs                | 32.75<br>Hrs                  | 13.00<br>Hrs  | \$12,709    | \$7,716                | 3,300 yd <sup>3</sup>        |                                               |                                                             |                                                                        |                                             |
| <hr/>                                           |               |                |               |                             |                               |               |             |                        |                              |                                               |                                                             |                                                                        |                                             |
| AVERAGES (weighted mean except for last column) |               |                |               |                             |                               |               |             |                        |                              |                                               |                                                             |                                                                        |                                             |
|                                                 |               |                |               |                             |                               |               |             | \$3.85/yd <sup>3</sup> | \$2.34/yd <sup>3</sup>       |                                               |                                                             | 69<br>yd <sup>3</sup> /pc-hr                                           | 0.5 mi                                      |

<sup>1</sup> All crossings in this table were bid as a Unit Price. Actual yardages were close (within 15%) to pre heavy equipment survey.

<sup>2</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 Ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case Dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>3</sup> Excavation rate is based on total hours of excavating equipment only (does not include fill disposal equipment hours).

<sup>4</sup> (B) = blade endhailed; (T) = truck endhailed.

<sup>5</sup> Hours for loader and trucks calculated by prorating over yardage of EOS 35+68 and RX-3; hours for 1450 Dozer prorated over EOS 35+68, RX-3, and EOS 43+27.

TABLE 4

DEEP DRAIN EXCAVATION COSTS

Rehabilitation Unit 87-2 South G-6 Road

| Worksite <sup>1</sup>                           | ACTUAL EQUIPMENT HOURS |                |               |  | HERE <sup>2</sup><br>Cost | Bid<br>Cost | Volume<br>(yd <sup>3</sup> ) | Bid<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | HERE<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | Excavation<br>Rate<br>(yd <sup>3</sup> /pc-hr) | Average<br>Dist to<br>Fill site<br>(one-way) |
|-------------------------------------------------|------------------------|----------------|---------------|--|---------------------------|-------------|------------------------------|-----------------------------------------------|------------------------------------------------|------------------------------------------------|----------------------------------------------|
|                                                 | D-8<br>Ripper          | 980-B<br>Excav | 1450<br>Dozer |  |                           |             |                              |                                               |                                                |                                                |                                              |
| DD1 @ Sta 11+93                                 | 0.25                   | 0.75           | 1.00          |  | \$159                     | \$193       | 100                          | \$1.93                                        | \$1.59                                         | 50                                             | 25 ft(B) <sup>3</sup>                        |
| DD2 @ Sta 20+94                                 | 0.25                   | 0.25           | -             |  | \$48                      | \$192       | 55                           | \$3.50                                        | \$0.88                                         | 110                                            | 50 ft(B)                                     |
| DD3 @ Sta 22+24                                 | 1.00                   | 1.25           | 1.25          |  | \$299                     | \$385       | 140                          | \$2.75                                        | \$2.13                                         | 40                                             | 35 ft(B)                                     |
| DD4 @ Sta 31+55                                 | 2.50                   | 1.25           | 1.50          |  | \$476                     | \$385       | 135                          | \$2.85                                        | \$3.52                                         | 31                                             | 40 ft(B)                                     |
| DD5 @ Sta 44+35                                 | 2.50                   | 1.75           | -             |  | \$418                     | \$579       | 300                          | \$1.93                                        | \$1.39                                         | 71                                             | 260 ft(B)                                    |
| DD6 @ Sta 57+00                                 | 0.50                   | 0.75           | -             |  | \$118                     | \$384       | 165                          | \$2.33                                        | \$0.72                                         | 132                                            | 75 ft(B)                                     |
| TOTALS                                          | 7.00<br>Hrs            | 6.00<br>Hrs    | 3.75<br>Hrs   |  | \$1,518                   | \$2,118     | 895 yd <sup>3</sup>          |                                               |                                                |                                                |                                              |
| AVERAGES (weighted mean except for last column) |                        |                |               |  |                           |             |                              |                                               |                                                |                                                |                                              |
|                                                 |                        |                |               |  |                           |             |                              | \$2.37/yd <sup>3</sup>                        | \$1.70/yd <sup>3</sup>                         | 53<br>yd <sup>3</sup> /pc-hr                   | 81 ft                                        |

<sup>1</sup> All Deep Drain worksites were bid as a lump sum instead of per yard payment. These worksites were not resurveyed, but volume removed is thought to be close to the pre heavy equipment survey.

<sup>2</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 Ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case Dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>3</sup> (B) = blade endhauled.

TABLE 5

TRUCK ENHAULED OUTSLOPE (EDS) COSTS

Rehabilitation Unit 87-2 South G-6 Road

| EDS <sup>3</sup><br>Worksite<br>@ Station | ACTUAL EQUIPMENT HOURS |                         |                                                 |               |                             | Bid<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | HERE <sup>1</sup><br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | Avg <sup>2</sup><br>Excavation<br>Rate<br>(yd <sup>3</sup> /pc-hr) | Road<br>Length<br>Treated | Avg Vol<br>per<br>ln-ft | Avg <sup>4</sup><br>Road<br>Width<br>[Removed] | Avg<br>Cut<br>Depth          | Avg<br>Dist to<br>Fill-site<br>(One-way) |                               |                  |                            |        |
|-------------------------------------------|------------------------|-------------------------|-------------------------------------------------|---------------|-----------------------------|-----------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|---------------------------|-------------------------|------------------------------------------------|------------------------------|------------------------------------------|-------------------------------|------------------|----------------------------|--------|
|                                           | Excavating Equipment   | Fill Disposal Equipment | Three<br>10-12yd <sup>3</sup><br>Dump<br>Trucks | 1450<br>Dozer | 3 yd <sup>3</sup><br>Loader |                                               |                                                             |                                                                    |                           |                         |                                                |                              |                                          |                               |                  |                            |        |
| 1+75                                      | 16.75                  | 12.00                   | --                                              | 18.00         | 54.00                       | 17.25                                         | \$10,598                                                    | \$7,757                                                            | \$5.76                    | \$4.22                  | 64                                             | 220 ft                       | 8.4                                      | 24 ft<br>[24 ft]              | 21 ft            | 1.3 mi<br>(T) <sup>5</sup> |        |
| 4+30                                      | 6.25                   | 6.00                    | --                                              | 7.00          | 21.00                       | 4.00                                          | \$5,296                                                     | \$2,921                                                            | \$5.46                    | \$3.01                  | 79                                             | 164 ft                       | 5.9                                      | 24 ft<br>[16 ft]              | 19 ft            | 1.2 mi<br>(T=90/B=10)      |        |
| 12+09                                     | 6.50                   | 3.00                    | --                                              | 6.00          | 18.00                       | 6.00                                          | \$5,293                                                     | \$2,614                                                            | \$6.70                    | \$3.31                  | 83                                             | 102 ft                       | 7.7                                      | 20 ft<br>[20 ft]              | 19 ft            | 0.3 mi<br>(T=80/B=20)      |        |
| 35+68                                     | 17.25                  | 17.75                   | --                                              | 23.00         | 66.15                       | 27.75                                         | \$26,498                                                    | \$9,878                                                            | \$5.62                    | \$2.10                  | 135                                            | 620 ft                       | 7.6                                      | 23 ft<br>[14 ft]              | 24 ft            | 0.5 mi<br>(T)              |        |
| 43+27                                     | 1.50                   | 1.50                    | --                                              | --            | 3.00                        | 1.00                                          | \$577                                                       | \$486                                                              | \$2.22                    | \$1.69                  | 87                                             | 85 ft                        | 3.1                                      | 21 ft<br>[13 ft]              | 14 ft            | 0.4 mi<br>(T=70/B=30)      |        |
| TOTALS or<br>AVERAGE                      | 48.25<br>Hrs           | 40.25<br>Hrs            | -                                               | 54.00<br>Hrs  | 162.15<br>Hrs               | 56.00<br>Hrs                                  | \$48,262                                                    | \$23,656                                                           | 8,575<br>yd <sup>3</sup>  | \$5.63/yd <sup>3</sup>  | \$2.76/yd <sup>3</sup>                         | 97<br>yd <sup>3</sup> /pc-hr | 1,191 ft                                 | 7.2<br>yd <sup>3</sup> /ln-ft | 22 ft<br>[17 ft] | 19 ft                      | 0.7 mi |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>2</sup> Excavation rate is based on total hours of excavating equipment only (does not include fill disposal equipment hours).

<sup>3</sup> Each EDS was bid a lump sum payment. Worksites were not resurveyed, but volume removed is thought to be close to the pre heavy equipment survey.

<sup>4</sup> Averages for road widths, road widths removed, and cut depths were obtained from the drafted cross-sections which were surveyed at control points along the outslope reaches.

<sup>5</sup> (T) = truck endhauled; (B) = blade endhauled; (T=70) = approximate percentage of material removed by truck.

TABLE 6

## BLADE ENDHAULED EXPORTED OUTSLOPE COSTS

Rehabilitation Unit 87-2 South G-6 Road

| EOS <sup>3</sup><br>Worksite<br>@ Station                          | ACTUAL EQUIPMENT HOURS |                |               |  | HERE<br>Cost | Bid<br>Cost | HERE<br>Cost | Volume<br>(yd <sup>3</sup> ) | Bid<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | HERE <sup>1</sup><br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | Average <sup>2</sup><br>Excavation<br>Rate<br>(yd <sup>3</sup> /pc-hr) | Road<br>Length<br>Treated | Avg Vol<br>Per<br>ln-ft       | Avg <sup>4</sup><br>Road<br>Width<br>[Removed] | Avg<br>Cut<br>Depth | Avg<br>Dist to<br>Fill-site<br>(one-way) |
|--------------------------------------------------------------------|------------------------|----------------|---------------|--|--------------|-------------|--------------|------------------------------|-----------------------------------------------|-------------------------------------------------------------|------------------------------------------------------------------------|---------------------------|-------------------------------|------------------------------------------------|---------------------|------------------------------------------|
|                                                                    | D-8<br>Ripper          | 980-B<br>Excav | 1450<br>Dozer |  |              |             |              |                              |                                               |                                                             |                                                                        |                           |                               |                                                |                     |                                          |
| 18+86                                                              | 0.50                   | 2.00           | 2.75          |  | \$772        | \$772       | \$412        | 390                          | \$1.98                                        | \$1.06                                                      | 74                                                                     | 64 ft                     | 6.1                           | 17 ft<br>[17 ft]                               | 23 ft               | 80 ft                                    |
| 32+29 <sup>5</sup>                                                 | -                      | 0.25           | -             |  | \$96         | \$96        | \$22         | 55                           | \$1.75                                        | \$0.39                                                      | 200                                                                    | 37 ft                     | 1.5                           | -                                              | -                   | 20 ft                                    |
| 44+62                                                              | 2.75                   | 2.75           | -             |  | \$772        | \$772       | \$531        | 390                          | \$1.98                                        | \$1.36                                                      | 60                                                                     | 138 ft                    | 2.8                           | 19 ft<br>[12 ft]                               | 15 ft               | 170 ft                                   |
| TOTALS                                                             | 3.25<br>Hrs            | 5.00<br>Hrs    | 2.75<br>Hrs   |  | \$1,640      | \$1,640     | \$965        | 835 yd <sup>3</sup>          |                                               |                                                             |                                                                        |                           |                               |                                                |                     |                                          |
| AVERAGES (weighted mean used for unit prices and excavation rates) |                        |                |               |  |              |             |              |                              | \$1.96/yd <sup>3</sup>                        | \$1.16/yd <sup>3</sup>                                      | 76<br>yd <sup>3</sup> /pc-hr                                           | 239 ft                    | 3.5<br>yd <sup>3</sup> /ln-ft | 18 ft<br>[14 ft]                               | 19 ft               | 90 ft                                    |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>2</sup> Excavation rate is based on the total excavation equipment hours.

<sup>3</sup> Each EOS was bid for a lump sum payment. Worksites were not resurveyed, but volume removed is thought to be close to the pre heavy equipment survey.

<sup>4</sup> Averages for road widths, road widths removed, and cut depths were obtained from the drafted cross-sections which were surveyed at control points along the outslope reaches.

<sup>5</sup> Worksite located on cutbank failure perched above upper left bank of RX-2.

TABLE 7

OUTSLOPE EXCAVATION COSTS

Rehabilitation Unit 87-2 South G-6 Road

| OS <sup>4</sup><br>Worksite<br>@ Station | ACTUAL EQUIPMENT HOURS |                |               |             | HERE<br>Cost | Volume<br>(yd <sup>3</sup> ) | Bid<br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | HERE <sup>1</sup><br>Unit<br>Price<br>(\$/yd <sup>3</sup> ) | Avg <sup>2</sup><br>Excavation<br>Rate<br>(yd <sup>3</sup> /pc-hr) | Road<br>Length<br>Treated | Avg<br>Vol<br>per<br>ln-ft    | Avg <sup>3</sup><br>Road<br>Width<br>[Removed] | Avg<br>Cut<br>Depth |
|------------------------------------------|------------------------|----------------|---------------|-------------|--------------|------------------------------|-----------------------------------------------|-------------------------------------------------------------|--------------------------------------------------------------------|---------------------------|-------------------------------|------------------------------------------------|---------------------|
|                                          | D-8<br>Ripper          | 980-B<br>Excav | 1450<br>Dozer | Bid<br>Cost |              |                              |                                               |                                                             |                                                                    |                           |                               |                                                |                     |
| 5+94                                     | 6.50                   | 8.75           | 7.00          | \$3,853     | \$1,921      | 2,280                        | \$1.69                                        | \$0.84                                                      | 102                                                                | 556 ft                    | 4.1                           | 32 ft<br>[14 ft]                               | 17 ft               |
| TOTALS or<br>AVERAGE                     | 6.50<br>Hrs            | 8.75<br>Hrs    | 7.00<br>Hrs   | \$3,853     | \$1,921      | 2,280 yd <sup>3</sup>        | \$1.69                                        | \$0.84                                                      | 102<br>yd <sup>3</sup> /pc-hr                                      | 556 ft                    | 4.1<br>yd <sup>3</sup> /ln-ft | 32 ft<br>[14 ft]                               | 17 ft               |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 Ripper; \$86.30 for 980-B Excavator; \$67.50 for 1450 Case Dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>2</sup> Excavation rate is based on the total excavation equipment hours.

<sup>3</sup> Averages for road widths, road widths removed, and cut depths were obtained from the drafted cross-sections which were surveyed at control points along the outslope reach.

<sup>4</sup> This outslope was bid as a lump sum payment. Worksite was not resurveyed, but volume removed is thought to be close to the pre heavy equipment survey.

TABLE 8

## CROSS-ROAD DRAIN (XRD) and INBOARD DITCH (IBD) COSTS

Rehabilitation Unit 87-2 South G-6 Road

| Treat-<br>ment | <u>Actual Equipment Hours</u> |                |               | Bid<br>Cost | HERE<br>Cost | Total<br>ln-ft | Total<br>Number<br>of XRDs<br>or IBDs | Avg<br>ln-ft<br>per<br>Drain | Bid<br>Unit<br>Price<br>(\$/ft) | HERE <sup>1</sup><br>Unit<br>Price<br>(\$/ft) |
|----------------|-------------------------------|----------------|---------------|-------------|--------------|----------------|---------------------------------------|------------------------------|---------------------------------|-----------------------------------------------|
|                | D-8<br>Ripper                 | 980-B<br>Excav | 1450<br>Dozer |             |              |                |                                       |                              |                                 |                                               |
| XRD            | 6.50                          | 4.00           | 0.75          | \$631       | \$1,089      | 1,028          | 23                                    | 45                           | \$0.61                          | \$1.06                                        |
| IBD            | --                            | 2.75           | --            | \$818       | \$237        | 607            | 5                                     | 121                          | \$1.35                          | \$0.39                                        |
| TOTALS         | 6.50<br>Hrs                   | 6.75<br>Hrs    | 0.75<br>Hrs   | \$1,449     | \$1,326      | 1,635<br>ln-ft | 28                                    | --                           | --                              | --                                            |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

TABLE 9

## MISCELLANEOUS COSTS

Unit 87-2 South G-6 Road

| Category                       | ACTUAL EQUIPMENT HOURS |                |               |                             |                                          | COST     |                      |
|--------------------------------|------------------------|----------------|---------------|-----------------------------|------------------------------------------|----------|----------------------|
|                                | D-8<br>Ripper          | 980-B<br>Excav | 1450<br>Dozer | 3 yd <sup>3</sup><br>Loader | Three<br>10-12 yd <sup>3</sup><br>Trucks | Contract | HERE <sup>1</sup>    |
| Paid Breaks                    | 5.50                   | 5.00           | 5.00          | 3.00                        | 9.00                                     | --       | \$1,985              |
| Access                         | 10.50                  | --             | 1.00          | --                          | --                                       | --       | \$1,187              |
| Travel                         | 0.50                   | 1.25           | 0.25          | --                          | --                                       | --       | \$178                |
| Disc./Wait                     | 8.25                   | 4.50           | 2.25          | 1.75                        | 2.25                                     | --       | \$1,657              |
| Mobilization<br>(Bid item 1&2) | --                     | --             | --            | --                          | --                                       | \$3,000  | \$3,901 <sup>2</sup> |
| Record Keeping<br>(Bid item 4) | --                     | --             | --            | --                          | --                                       | \$50     | --                   |
| Miscellaneous<br>(Bid item 6)  | --                     | --             | --            | --                          | --                                       | \$300    | --                   |
| Totals                         | 24.75                  | 10.75          | 8.50          | 4.75                        | 11.25                                    | \$3,350  | \$8,908              |

<sup>1</sup> HERE (Heavy Equipment Rental Equivalent) = actual hours worked for each task using hourly costs of \$106.63 for D-8 ripper; \$86.30 for 980-B excavator; \$67.50 for 1450 Case dozer; \$80.20 for Clark 3 yd<sup>3</sup> loader; \$43.19 for each 10-12 yd<sup>3</sup> dump truck. These are the average costs for similar equipment which was bid for hourly work in 1987.

<sup>2</sup> Based on lowboy rates of \$55/hr and an estimated travel time of 5 hrs each way from the contractor's business address in Miranda, California.

TABLE 10

## STRAW MULCH COSTS

Rehabilitation Unit 87-2 South G-6 Road

|                                                       | Straw<br>Supplier | NPS<br>Labor | Redwoods<br>United<br>(RUI) | Youth<br>Conservation<br>Corps (YCC) | TOTALS                                      |
|-------------------------------------------------------|-------------------|--------------|-----------------------------|--------------------------------------|---------------------------------------------|
| Straw 547 bales<br>(cost & delivery<br>@ \$3.09/bale) | \$1,690           | --           | --                          | --                                   | \$1,690                                     |
| Unloading                                             | --                | \$499        | --                          | --                                   | \$499                                       |
| Distributing                                          | --                | \$2,253      | --                          | --                                   | \$2,253                                     |
| Spreading                                             | --                | \$407        | \$945                       | \$402                                | \$1,754                                     |
| TOTALS:                                               | \$1,690           | \$3,159      | \$945                       | \$402                                | <b>\$6,196</b><br>or<br><b>\$11.33/bale</b> |

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Unit: 87-2 Date: 10-19-1987, PP3, 35mm



Unit: 87-2 Date: 7-13-1988, PP3, 35mm, (DLD)



Unit: 87-2 Date: 5-18-1987, PP5A G-6 STA 11+93



Unit: 87-2 Date: 10-19-1987, PP5A, 35mm, (MH)



Unit: 87-2 Date: 7-13-1988, PP5A, 35mm, (DLD)



Unit: 87-2 Date: 5-18-1987, PP8 G-6 STA 32+85



Unit: 87-2 Date: 10-19-1987, PP8, 35mm, (MH)



Unit: 87-2 Date: 7-13-1988, PP8, 28mm, (DLD)



Unit: 87-2 Date: 5-18-1987, PP10B G-6 STA 40+40



Unit: 87-2 Date: 10-19-1987, PP10B, 35mm, (MH)